Welcome to today's public webinar!



"Exploring the potential of Telecoupling for improving European land management"

<u>18 April 2024, online</u>

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or EC-CINEA. Neither the European Union nor the granting authority can be held responsible for them.





Agenda –18 April 2024

13:00-13:05Brief introduction of the Europe-LAND project

Franziska Wolf (Hamburg University of Applied Sciences, Germany - HAW)

13:05-13:20Land use change in a globalised world: A telecoupling approach

Cecilie Friis (University of Copenhagen, Denmark)

13:20-13:35How to deal with factors/variables in biodiversity
assessment? Methods and applications

Alexander Fehér (Slovak University of Agriculture in Nitra, Slovakia)

13:35-13:50 Telecoupling frameworks for examining human-environment interactions: the Europe-LAND approach

Danka Moravčíková, Martina Hanová (Slovak University of Agriculture in Nitra, Slovakia)

13:50-14:00 Q&A and end of the webinar

18 April 2024, online

Speaker: Franziska Wolf, Hamburg University of Applied Sciences, Germany



"Introducing the Horizon Europe project "Towards Sustainable Land-use Strategies in the Context of Climate Change and Biodiversity Challenges in Europe"

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or EC-CINEA. Neither the European Union nor the granting authority can be held responsible for them.





- Consortium: 13 partners (12 countries, 8 cases), 2 Associates (FIN, LIT)
- Duration: 1 June 2023 til 31 May 2027



Main Objective:

to identify, develop, test and implement integrated tools to **improve the understanding of the factors behind land-use decisions** as well as the **stakeholders' awareness and engagement** in terms of climate change and biodiversity challenges across Europe.

This includes **increasing the knowledge base** on how such decision can be oriented towards the efficient and socially responsible pursuit of multiple policy objectives on various scales in order to **gain a national, regional and pan-European vision** that supports land-use strategies, climate change mitigation and adaptation, as well as biodiversity conservation.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or EC-CINEA. Neither the European Union nor the granting authority can be held responsible for them.

Funded by the European Union



Methodology

WP1 Project coordination, management, administration

- Management structure
 Project management
- Data Management Plan - Monitoring & Evaluation

WP 2 Revealing agricultural land-use behaviour and its drivers in Europe

- Assessment of modelling tools

- Harmonization of location factor and driving

force data

- Analysis of future land-use patterns

- Development of indicators of transformation

Inventorise data
 Establish typologies

- Analyse changes - Focus on wetlands



national-level analyses, land use/land management surveys, policy assessments, social network analyses, development of a telecoupling framework, comparative studies, modelling of land-use changes, living labs/stakeholder interaction (interviews, focus groups)

complemented by

- 8 local cases as demonstrators (cross-cutting feature) and a toolbox for interactive land-use scenario exploration
- capacity-building (open access), Community of Practice

WP 3 Assessing awareness WP 4 Mapping future landbehind land-use decisions use and land-cover patterns



Policy assessment
 Living Lab Framework
 Engagement of stakeholders
 Analysis of drivers of change
 Online Workshops

Case Studies

Western Europe

- Bisshare Deserve of Castre Verd
- Biosphere Reserve of Castro Verde, Portugal
- UNESCO-Biosphere Reserve Schorfheide-Chorin, Germany

WP 5 Supporting climate change mitigation and adaptation and biodiversity policy



 Analysis of telecoupling frameworks
 Development of a telecoupling framework with social component
 Comparative studies and implementation of the framework
 Modelling future land-use and change
 Supporting stakeholders' decision making

Eastern Europe

- Braila Islands, Romania
- LTSER Trnava, Slovakia
- West Estonian Archipelago Biosphere Reserve, Estonia
- Białowieża Forest, Poland
- Biosphere reserve of the Krkonoše Mts. National Park, Czech Republic

WP 6 Europe-LAND Toolbox



Development and testing of the Toolbox
 Land-use Scenario Exploration

- Technical capacity building seminars
 - Improving professional skills and expertise
 - Exploitation Plan

WP 7 Information, communication, upscaling and capacity-building

- Communication, Dissemination, Up-scaling and Exploitation Plan - Project' branding, communication material and digital outreach - Strategic Stakeholder Engagement - Dissemination in publications and events



Zooming in –our 8 case studies

Case studies in **different environmental regions** of Europe, aiming to <u>provide an in-depth understanding</u> of land users' behaviour and conditions of local land-use decisionmaking

Criteria for selecting the case studies:

- *Main focus* (agriculture, forestry, protected areas)
- <u>Trade-offs</u> between conservation and land use
- Connection with *LTSER sites*
- Previous <u>connection with stakeholders</u> (co-creation)
 participatory (Living-lab) approach



Map background: The Environmental Stratification of Europe (Metzger, 2018)



Save-the-dates - Upcoming project actions, learning and networking activities

- 30 May 2024, 10:00 (CET) Europe-LAND's 7th public webinar on The Europe-LAND Toolbox
- New Open access paper released: Schiller, J., <u>Jänicke, C.</u>, Reckling, M. *et al.* Higher crop rotational diversity in more simplified agricultural landscapes in Northeastern Germany. *Landsc Ecol* **39**, 90 (2024). https://doi.org/10.1007/s10980-024-01889-x
- Meet our researchers at the following conferences:
 - 24-27 June 2024: 10th Nordic Geographers Meeting, Copenhagen, Denmark
 - 26-28 June 2024: IAMO Forum the functions of land in times of change, Halle, Germany
 - 24.-30 Aug 2024: 35th International Geographical Congress 2024, 24th to 30th August 2024 in Dublin, Ireland

All events are announced on our project website <u>www.europe-land.eu</u> !!!!!

HAW HAMBURG



Thank you for your attention!

Team Hamburg

Prof Walter Leal, Franziska Wolf, Jasmin Röseler, Dominique da Silva, Sven Kannenberg

Hamburg University of Applied Sciences, Research and Transfer Centre "Sustainable Development and Climate Change Management", Ulmenliet 20, D-21033 Hamburg, Germany **Contact:** info@europe-land.eu



Project website: www.europe-land.eu

Join our LinkedIn Community at https://www.linkedin.com/company/europe-land/





Europe-LAND Webinar 18th April 2024

Cecilie Friis Section for Geography Department of Geosciences & Natural Resource Management, University of Copenhagen

UNIVERSITY OF COPENHAGEN



Land-use and sustainability challenges in a globalised world













Land system science approaches to distal drivers

- Increasing spatial "de-coupling" of causes and outcomes of land-use change (Reenberg et al. 2010; van Vliet et al. 2016)
- "Distal drivers" of change: Leakages, displacements, urban land teleconnections (e.g. Lambin & Meyfroidt 2011; Seto et al. 2012; Meyfroidt et al. 2013)
- Challenges for land system governance → from territorial to flow-based governance (Sikor et al. 2013)





Telecoupling

...socioeconomic and environmental linkages between distant coupled human-environment systems (Liu et al. 2013; Liu et al. 2014)

...deal with global interconnectivity and intertwinement of local and global agents, demands and drivers (Eaken et al. 2014; Friis et al. 2016)



Telecoupling framework



Liu et al. 2013



COUPLED-ITN.eu

Telecoupling as a heuristic device

...opens up place-based coupled systems approach to networked and relational understandings of human-environment change (Friis & Nielsen 2019; Friis et al. 2016)

..." captures not only the 'action at a distance' but also the feedback between social processes and land outcomes in multiple interacting systems" (Eakin et al. 2014: 143)



...changing scope of governance



18/04/2024 9

Example: Rice to banana in Laos

How & *why* are rice fields converted to banana plantations in northern Laos?



Friis & Nielsen 2016, 2017a & b

A telecoupled land-use change

- Main flows and drivers •
 - Market demand urban middleclass
 - **Environmental degradation**
 - Policy "flows": *Turning land into capital* & development aspirations
- Spillover flows •
 - Geopolitical conflict Philippines/China \rightarrow South Chinese Sea
 - Typhoons and soil degradation
 - Fusarium Wilt ("Panama Disease")





Challenges and potentials for telecoupling research

- An interdisciplinary framework → requires multiple perspectives and methodologies
- Bringing place-based and flow- or networkoriented analyses together
- "Flows" operate through very different modes and logics → requires different methodological approaches
- Productive analytical tensions → Scale, distance, system boundaries, connections and agents
- Require a degree of interdisciplinary 'literacy' and agility





Land-use change in a globalised world: The telecoupling approach

• The telecoupling approach

- Useful heuristic tool for dealing with globalisation of land-use change
- Bringing together systemic and relational approach to human-environment change
- Allows us to think in terms of many different land-uses, flows and feedbacks
- Potentials for telecoupling research
 - A common framework from which to approach similar questions from different perspectives or analytical entry points
 - Requires team and collaborative research bringing multiple methodologies together
 - Exploring productive analytical tensions





How We Work

Open Science Meetings

Working Groups

Agricultural Land Abandonment as a Global Land-Use Change Phenomenon

Archetype Analysis

BeModeLS: Behavioural Models of Land Systems

Co-Production of Sustainable Land Systems

Global Dryland Social-Ecological Systems

Governance of Social-Ecological Systems

Integration of Rural and Urban Land Systems

Remittance Dynamics and Land Change



Workers harvesting bananas for export to the Chinese market, Luang Namtha Province, Laos, February 2018. Photo: Cecilie Friis

Telecoupling Research Towards Sustainable Transformation of Land Systems

Interested in joining this working group? Membership is open to all GLP members.

Not a GLP member yet? Sign up here. Membership is free and required for joining working groups.

JOIN THIS WORKING GROUP

https://glp.earth/how-we-work/working-groups/telecoupling-research-towards-sustainable-transformation-land-systems



Literature

- Adger, W. N., Eakin, H., & Winkels, A. (2009). Nested and teleconnected vulnerabilities to environmental change. *Frontiers in Ecology and the Environment, 7*(3), 150-157. doi:10.1890/070148
- Challies, E., Newig, J., & Lenschow, A. (2019). Governance for Sustainability in Telecoupled Systems. In C. Friis & J. Ø. Nielsen (Eds.), *Telecoupling: Exploring Land-Use Change in a Globalised World* (pp. 177-197): Springer International Publishing.
- Eakin, H., DeFries, R., Kerr, S., Lambin, E. F., Liu, J., Marcotullio, P. J., ... Zimmerer, K. (2014). Significance of telecoupling for exploration of land-use change. In K. C. Seto & A. Reenberg (Eds.), *Rethinking Global Land Use in an Urban Era.* (pp. 141-161). Massachusetts, USA: The MIT Press.
- Eakin, H., Rueda, X., & Mahanti, A. (2017). Transforming governance in telecoupled food systems. *Ecology and Society, 22*(4). doi: https://doi.org/10.5751/ES-09831-220432
- Friis, C., & Nielsen, J. Ø. (2016). Small-scale land acquisitions, large-scale implications: Exploring the case of Chinese banana investments in Northern Laos. Land Use Policy, 57, 117-129. doi:http://dx.doi.org/10.1016/j.landusepol.2016.05.028
- Friis, C., & Nielsen, J. Ø. (2017a). Land-use change in a telecoupled world: the relevance and applicability of the telecoupling framework in the case of banana plantation expansion in Laos. *Ecology and Society, 22*(4). doi:10.5751/ES-09480-220430
- Friis, C., & Nielsen, J. Ø. (2017b). On the System. Boundary Choices, Implications, and Solutions in Telecoupling Land Use Change Research. *Sustainability, 9*(6), 974. doi:<u>https://doi.org/10.3390/su9060974</u>
- Friis, C, & Nielsen, JØ (Eds.). (2019). *Telecoupling. Exploring land-use change in a globalised world.* Palgrave Macmillan.
- Lambin, EF, & Meyfroidt, P (2011). Global land use change, economic globalization, and the looming land scarcity. *Proc. Natl. Acad. Sci., 108*(9), 3465-3472. DOI https://doi.org/10.1073/pnas.1100480108
- Liu, J., Hull, V., Batistella, M., DeFries, R., Dietz, T., Fu, F., . . . Zhu, C. (2013). Framing sustainability in a telecoupled world. *Ecology and Society, 18*(2). doi:<u>http://dx.doi.org/10.5751/ES-05873-180226</u>
- Meyfroidt, P, Lambin, EF, Erb, K-H, & Hertel, TW (2013). Globalization of land use: distant drivers of land change and geographic displacement of land use. *Curr. Opin. Environ. Sustain., 5*(5), 438-444. DOI <u>http://dx.doi.org/10.1016/j.cosust.2013.04.003</u>
- Millington, JD, Xiong, H, Peterson, S, & Woods, J (2017). Integrating Modelling Approaches for Understanding Telecoupling: Global Food Trade and Local Land Use. Land, 6(3), 56. DOI http://www.mdpi.com/2073-445X/6/3/56
- Newig, J., Lenschow, A., Challies, E., Cotta, B., & Schilling-Vacaflor, A. (2019). What is governance in global telecoupling? *Ecology and Society, 24*(3). doi:10.5751/ES-11178-240326
- Reenberg, A, Langanke, T, Kristensen, SBP, & Colding, TS. (2010). Globalisation of agricultural landscapes a land systems approach. In J Primdahl & S Swaffield (Eds.), *Globalisation and Agricultural Landscapes. Change patterns and policy trends in Developed countries* (pp. 31-56). Cambridge University Press. Cambridge.
- Seto, K. C., Reenberg, A., Boone, C. G., Fragkias, M., Haase, D., Langanke, T., ... Simon, D. (2012). Urban land teleconnections and sustainability. *Proceedings of the National Academy of Sciences, 109*(20), 7687-7692. doi:https://doi.org/10.1073/pnas.1117622109
- Sikor, T, Auld, G, Bebbington, AJ, Benjaminsen, TA, Gentry, BS, Hunsberger, C, Izac, A-M, Margulis, ME, Plieninger, T, Schroeder, H, & Upton, C (2013). Global land governance: from territory to flow? *Curr. Opin. Environ. Sustain., 5*(5), 522-527. DOI http://dx.doi.org/10.1016/j.cosust.2013.06.006
- van Vliet, N, Mertz, O, Heinimann, A, Langanke, T, Pascual, U, Schmook, B, Adams, C, Schmidt-Vogt, D, Messerli, P, Leisz, S, Castella, J-C, Jørgensen, L, Birch-Thomsen, T, Hett, C, Bech-Bruun, T, Ickowitz, A, Vu, KC, Yasuyuki, K, Fox, J, Padoch, C, Dressler, W, & Ziegler, AD (2012). Trends, drivers and impacts of changes in swidden cultivation in tropical forest-agriculture frontiers: A global assessment. *Global Environ. Change, 22*(2), 418-429. DOI 10.1016/j.gloenvcha.2011.10.009

Webinar 6

How to deal with factors/variables in biodiversity assessment? Methods and applications

> 18 April 2024 Alexander Fehér, SUA Nitra

Europe-LAND

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or EC-CINEA. Neither the European Union nor the granting authority can be held responsible for them.







Key words

Biodiversity

Talking about ecology without knowledge of biodiversity is the same as wanting to learn foreign languages and not knowing the words. *Pavel Pecina*

Information All information is incomplete and we must treat it with respect. Jacob Bronowski

Complexity

I've never seen a complicated system that doesn't get more complicated when you look at it properly.

Paul Anderson









https://frompuatoeternity.blogspot.com/2021/02/biodiversity.html



Statistics in D1 or D2 are not enough ... how many factors so many dimensions

file description probabilty average, mode, median, quantile, variability, variation range, standard deviation statistical hypothesis testing ANOVA regression analysis correlation analysis

> Slovak University of Agriculture in Nitra



Hydrogen and oxygen ... or water?











https://laboutiquedestoons.com/en/blog/post/Discover-the-incredible-story-of-spiderman





10D plotted in 2D? 20D plotted in 2D? etc.

compression while preserving essential data characteristics





Compromise without losing sense







... and when we have many environmental/ecological variables (BIODIVERSITY!!!)

relationships can be explored using

multivariate methods!!!! Dendrogram, ordination (PCA, RDA, CCA ...)





Gradient analysis

	Non-direct	Direct	Hybrid
Linear	PCA	RDA	hRDA
Unimodal	CA	CCA	hCCA
Detrended	DCA	DCCA	hDCCA

and also

PCoA principal coordinates analysis

CAP canonical analysis of principal coordinates

dbRDA distance based redundancy analysis

nMDS nonmetric multidimensional scaling ...





The choice of ordination methods

- Data type
- Similarity distance matrix (Euclidean, Sørensen, Jaccard ...)
- What you want to say

Null values??? Missing values???

.xls to .dta

DIFFERENT RESULTS!







Fig. 1. Principal component analysis (PCA) of the relationships between *Salix* energy plants and their understory plant species in different willow varieties (Tordis, Tora and Inger). Plant species: 6 -Aster novi-belgii, 14 - Cirsium arvense, 16 - Clematis vitalba, 27 - Equisetum arvense, 32 - Galium aparine, 33 - Geum urbanum, 41 - Lathyrus tuberosus, 45 - Padus serotina, 67 - Swida sanguinea, 68 - Symphytum officinale, 69 -Tanacetum vulgare, 70 - Taraxacum sect. Ruderalia, and 76 - Urtica dioica. Nonnumbered species (1 to 79) were concentrated in a cluster around point 0.



SUA Slovak University of Agriculture in Nitra

FEHÉR, Alexander - PINTÉR, Eduard - PRUS, Piotr - KONČEKOVÁ, Lýdia. Dependence of Weed Composition on Cultivated Plant Species and Varieties in Energy-Tree and -Grass Plantations. In Agronomy-Basel, 2020, vol. 10, iss. 9, article number 1247 [11 p.]





- When the numerical value of one variable increases or decreases, the numerical value of the other variable has a tendency to change in the same way.
- When variables are negatively ("inversely") correlated, they are positioned on opposite sides of the plot.

LENGTH OF AXES etc.



SUA Slovak University of Agriculture in Nitra





Figure 2. Principal components analysis (PCA) of relationships between Ellenberg indicator values of ground-flora species in different plots: (1), Tordis (willow); (2), Inger (willow); (3), Pegaso (poplar); and (4), Miscanthus × giganteus. Ellenberg indicator values: Moist, moisture; pH, soil reaction; Light; Contin, continentality; Temp, temperature; and N, nitrogen.



FEHÉR, Alexander - KONČEKOVÁ, Lýdia - HALMOVÁ, Daniela - PRUS, Piotr - IZAKOVIČOVÁ, Zita - DRĂGOI, Marian. Vascular plants diversity in short rotation coppices: A reliable source of ecosystem services or farmland dead loss? In iForest- Biogeosciences and Forestry. 2020, vol. 13, iss. 4, pp. 345-350





Fig. 3. Redundancy analysis (RDA) of correlations between the selected quantified vectors of waste management in the Nitra Region and Košice Regions in Slovakia in 2021. Legend: independent determinants are marked in blue: the importance of geographical affiliation - Region, distance from the district town - Distance, average altitude of the municipality - SeaLev, population - Pop, aging index - Age, presence of marginalized groups in the municipality - Marg, fees for the municipal waste -WastPay, presence and amount of the reported illegal landfills - Illeg, political affiliation of the mayor - Policy; dependent factors are marked in red: amount of the produced waste -Waste, construction waste - Constr, amount of the registered bio-waste - BioW, employees in the waste management - Staff, in-house services in the waste management - Serv, own recycling of waste - Rec, local voluntary activities in the waste management -Volunt, share of removed illegal landfills - IllegR; A1-A3 and B1-B3 - clusters).



BUMBALOVÁ, Monika - FEHÉR, Alexander - PRČÍK, Martin - MARIŠOVÁ, Eleonóra. Who holds the keys to the management of municipal waste and which locks of municipal sustainability do they fit into? In Polish Journal of Environmental Studies, 2024, vol. 33, no. 2, p. 1017-1031



... do not forget!

- Explained variance! In %
- Permutation test or re-randomization test or shuffle test (e.g. Monte Carlo)
 A permutation test involves 2< samples.
 The null hypothesis is that all samples come from the same distribution.
- E.g. in Canoco and CanoDraw





Thank you for your attention!







Telecoupling frameworks for examining human-environment interactions: the Europe-LAND approach 18th April 2024 Speaker: Danka Moravčíková, Martina Hanová SUA



Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or EC-CINEA. Neither the European Union nor the granting authority can be held responsible for them.





WP5: Supporting climate change mitigation and adaptation efforts and biodiversity policy design

Main aim:

- to construct and test the novel telecoupling framework;
- to accommodate informed policy-making.
- Europe-LAND approach:
- is based on interdisciplinary and transdisciplinary work (ssн contribution);
- integrates modelling tools and participatory instruments;
- combines the assessment of past trends in land use with biophysical and socioeconomic factors.





Climate change is a social process embedded in specific social systems, past and present.

Dunlap, R., Brulle, R. (Eds). 2015. *Climate Change and Society: Sociological Perspectives.* Oxford University Press.



Climate change and telecoupling: importance of social sciences knowledge

Six key aspects:

- 1. historical and contextual complexities
- 2. consequences
- 3. conditions and visions for change
- 4. interpretation and subjective sense making
- 5. responsibilities
- 6. governance and decision making.



Climate change and telecoupling: importance of social sciences knowledge

Methodological starting points:

- The review on causality in telecoupling (Carlson et al., 2018) reported that 62.9% (n=56) of the reviewed papers provided only descriptive statements.
- Of these, a majority used QLT secondary data and only two papers used both QLT and QNT analysis (e.g. network analysis, simulation modeling, statistics).



SUA Slovak University of Agriculture in Nitra

Our scanning methodology of telecoupling frameworks

- publications indexed in the WoS and Scopus databases ranked Q1 to Q4;
- publications published between 2018 and 2023;
- use of telecoupling as the framework, where at least one component of the telecoupling framework is explicitly labelled and telecoupling is mentioned;
- English language only.





- final dataset with **138 unique articles and 1 book**;
- **3 groups** of articles: I. primarily with unique QNT research (48), II. primarily with unique QLT (19), III. review articles (71);
- (PRISMA): after excluding review articles, a subset of articles consisting of 67 unique articles was created and imported into MAXQDA 2022 software.





















SUA Slovak University of Agriculture in Nitra



The research gaps have been grouped together around common areas to form **11 thematic clusters**.

For each research gap the relevance for **five cross-cutting policy issues** is flag(s)ged:

- ▶ international cooperation
- digitalisation and artificial intelligence
 - ecosystems and biodiversity
 - social sciences and humanities
 - ▶ gender





Key messages for Europe-LAND approach

CLUSTER 8: LAND USE, AGRICULTURE AND CARBON DIOXIDE REMOVAL CLUSTER 9: EQUITY AND JUST TRANSITIONS CLUSTER 10: ACCELERATING CLIMATE ACTION: LEVERS AND ENABLERS Social science research is essential to determine the most effective messages and tools.





Thanks for your attention



